

DETAILED ACTION

Status of Application

1. Claims 1 – 17 are pending and presented for the examination. Claims 18 – 23 have been withdrawn from consideration.

Information Disclosure Statement

2. The information disclosure statements (IDSs) were submitted on February 18, 2005, April 28, 2005, and November 14, 2007, respectively. These submissions are in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statements are being considered by the examiner. The foreign patent document NL 257692 was not considered because no English translation was provided. Please refer to applicant's copy of form PTO-1449 submitted herewith.

Priority

3. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Drawings

4. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character "41" has been used to designate both a tap hole for tapping off molten iron and slag and an apparatus that aids in supplying iron oxide in the

melting cyclone in Fig. 7. However, the reference character "41" that points to the apparatus that aids in supplying iron oxide in the melting cyclone is not defined in the specification. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1– 11 and 16 – 17 are rejected under 35 U.S.C. 102(b) as being anticipated by Klaassen et al. (US 5,662,860).

In regards to claim 1, the abstract, Fig. 2, and col. 3 lines 35 – 62 of Klaassen et al. disclose a metallurgical vessel for iron making comprising a bottom portion, a sidewall and a lance arrangement of at least two lances for supplying oxygen gas to the

interior of the vessel in operation wherein each lance comprises an end portion for emitting oxygen gas wherein the lance arrangement is configured so as to achieve in operation a substantially downwardly directed flow of post-combusted gases at the side wall of the vessel. The lance arrangement would also achieve a substantially upwardly directed flow of post-combusted gases in the center of the vessel because the lances seen in Fig. 2 of Klaassen et al. are oriented in the same way as those of Fig. 1 in the instant application. Also, the statement in claim 1 that the metallurgical vessel is for iron and steel making is intended use and therefore is not a claim limitation (see MPEP 2111.02).

In regards to claim 2, Fig. 2 and col. 2 lines 36 – 46 of Klaassen et al. teach that at least one of the lances is provided with means for emitting a plurality of jets of oxygen containing gas from its end portion. It can be seen in Fig. 2 that a plurality of jets of oxygen gas are emitted from the end of the lance 23.

Regarding claim 3, Fig. 2 and col. 3 lines 54 – 57 of Klaassen et al. disclose that the metallurgical vessel has at least one lance that projects through the roof portion of the metallurgical vessel.

In regards to claims 4 – 7, Fig. 2, col. 2 lines 41 – 46, and col. 3 lines 54 – 59 of Klaassen et al. disclose a metallurgical vessel wherein at least one lance is arranged to direct the oxygen containing gas towards a central axis of the metallurgical vessel (see Fig. 2). Klaassen et al. also disclose a metallurgical vessel wherein at least one of the lances is inclined from the vertical under a first acute angle with its end portion inclined towards the central axis of the metallurgical vessel (see Fig. 2). Also, Klaassen et al.

teach that the part 20 in Fig. 2 can have an enlarged cross-section to make it possible to position the lances more vertically. Therefore, by changing the cross-section of part 20, it would be possible for the metallurgical vessel wherein the end portion of the lance is configured to direct the oxygen containing gas towards the central axis of the metallurgical vessel under a second acute angle from the vertical which second acute angle is greater than the first acute angle. Finally, it can be seen in Fig. 2 of Klaassen et al. that the end portions of the lances are all of equal distance from the sidewall.

Regarding claim 8, col. 2 lines 36 – 46 of Klaassen et al. teach that the means for supplying oxygen to the metallurgical vessel consist of a plurality of lances projecting laterally through the wall of the metallurgical vessel. Therefore, the metallurgical vessel may comprise three or more lances since it is known that the definition of plurality is more than one.

In regards to claims 9 – 11, Fig. 2, col. 2 lines 47 – 60, and col. 3 lines 52 – 54 of Klaassen et al. disclose a metallurgical vessel wherein through at least one feed chute, particulate material is added to the vessel in the substantially downwardly directed flow of post-combusted gases. They also teach that the means for supplying coal comprises at least one lance. Thus, the metallurgical vessel has a plurality of feed chutes projecting through a roof portion of the vessel. Also, each lance could have a corresponding feed chute since there can be multiple feed chutes.

Regarding claim 16, Fig. 2 and col. 2 lines 10 – 16 of Klaassen et al. disclose a metallurgical vessel comprising a melting cyclone mounted directly above and in direct open communication with the metallurgical vessel.

In regards to claim 17, Fig. 2 and col. 2 lines 36 – 46 of Klaassen et al. teach a metallurgical vessel wherein the lances are positioned to avoid contact with molten material passing downwards from the melting cyclone to the metallurgical vessel.

All the critical elements required by claims 1– 11 and 16 – 17 are well taught and thus, the claims are properly included in this rejection.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 12 – 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Klaassen et al. (US 5,662 860).

In regards to claim 12, Fig. 2, col. 2 lines 47 – 60, and col. 3 lines 52 – 54 of Klaassen et al. teach a metallurgical vessel of claim 11 (see 102 (b) rejection above) wherein each feed chute is positioned between the lance and the sidewall of the metallurgical vessel. However, Klaassen et al. does not teach that the feed chute is positioned between the lance and the sidewall of the metallurgical vessel in a radial direction. Although Klaassen et al. do not disclose the positioning of the feed chute and the lance in a radial direction, the feed chute taught by Klaassen et al. is positioned in the substantially downward flow of the post-combusted gas. Therefore, it performs the same function as the feed chute recited in claim 12. It would have been obvious to one of ordinary skill in the art to position the feed chute between the lance and the sidewall

of the metallurgical vessel in a radial direction after routine experimentation to optimize the position.

Regarding claims 13 and 14, Fig. 2 and col. 3 lines 35 – 62 of Klaassen et al. disclose a metallurgical vessel according to claim 1 (see 102 (b) rejection above) wherein the sidewall comprises a lower portion for accommodating a molten metal bath and a slag layer and an upper portion for accommodating a slag layer wherein the at least two lances for supplying oxygen containing gas to the upper portion of the vessel project into the upper portion of the vessel and wherein a plurality of tuyeres for supplying gas in the lower portion of the vessel are arranged around the circumference of the lower portion of the vessel. Klaassen et al. also disclose a metallurgical vessel wherein the diameter of the lower portion of the vessel is smaller than that of the upper portion (see Fig. 2).

Although claim 13 recites that the metallurgical vessel comprises a lower portion for accommodating a molten metal bath and a slag layer and an upper portion for accommodating a slag layer and that the plurality of tuyeres are for supplying gas and/or liquid and/or solids and/or plasma into the slag layer in the lower portion of the vessel, these are intended uses for the metallurgical vessel and therefore do not have patentable weight (see MPEP 2111.02). Also, when comparing Fig. 2 of Klaassen et al. and the drawings of the instant application the tuyeres for supplying gas and/or liquid and/or solids and/or plasma into the slag layer in the lower portion of the vessel are not in the exact same position in the metallurgical vessel. However, it would have been obvious to one of ordinary skill in the art to position the tuyeres in an optimal position as

determined by routine experimentation. One would have been motivated to make such modification via routine optimization because it ensures the quality of the final product.

9. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Klaassen et al. (US 5,662 860) in view of Beggs et al. (US 4,248,408).

In regards to claim 15, Fig. 2 and col. 3 lines 35 – 62 of Klaassen et al. disclose the metallurgical vessel according to claim 13 as discussed above. However, Klaassen et al. do not teach that the tuyeres comprise oxy-fuel burners. It would have been obvious to one of ordinary skill in the art to modify Klaassen et al. in view of Beggs et al. because Beggs et al. disclose a multiplicity of oxy-fuel burners positioned peripherally in the lower region of a furnace used to melt the reduced iron and associated slag (see col. 4 lines 3 – 23). Since it is well known in the art that oxy-fuel burners can be used to heat molten metal as disclosed in Beggs et al., it would have been obvious to one of ordinary skill in the art to use tuyeres comprising oxy-fuel burners as recited in claim 15. One would have been motivated to make such modification, with reasonable expectation of success, because the modification would allow the industry to make efficient tuyeres via a cost effective manufacturing process by utilizing the known techniques exhibited in the cited references of the record.

Conclusion

10. No claim is allowed. All pending claims are rejected.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Caitlin Fogarty whose telephone number is 571-270-

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3589. The examiner can normally be reached on Monday - Friday 8:00 AM - 5:30 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vickie Kim can be reached on (571) 272-0579. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

CF

/Vickie Kim/

Supervisory Patent Examiner, Art Unit 4116